

New Evidence on the Importance of Motor Control in Preventing

Why do some people get back pain over and over while others recover without a single recurrence? That's the question of a study from Australia. They suspected that activity of the deep muscles in the back might be different in some people. They wanted to know if there was a difference in the timing of muscle activity between people who had bouts of back pain.

In fact, one-third of all adults with low back pain will develop pain again. And that's even after returning to normal function after recovery from the first episode. Studies have shown that there is a problem with muscle relaxation. Messages from the brain to the muscles become mixed up so that the muscles lose the ability to fine tune motion of the vertebrae.

Two groups of subjects were compared. One group had low back pain on one side (*unilateral*) that came and went. Due to the nature of their pain, they were symptom-free. The second (control) group were healthy adults with no history of back pain.

Using *electromyography* (EMG) to record the electrical activity of the muscles, the researchers compared the activity of short and long muscle fibers of back and shoulder muscles. Recordings of muscle activity were taken from both sides of the spine. Surface electrodes were used to get accurate EMG readings.

Measurements were taken as the subjects moved their arms forward 45-degrees. Arm movement was used because pain in the shoulder is often a symptom of back problems. It was known that such movement causes activity in the back muscles. This testing procedure gives a reliable way to measure changes in the timing of muscle activity of the back muscles that control spinal motion.

EMG makes it possible to tell exactly when the muscle starts to respond and the pattern of muscle activity. They were interested in comparing the timing of the response of the *lumbar multifidus* muscle in the back in relation to the *deltoid* muscle of the shoulder. They expected to find differences in the timing of muscle activity patterns between the two groups of patients.

What they found was that when the control group moved their arms, short muscle fibers of the multifidus started firing before the long fibers. But in the group with recurrent low back pain, there was no difference in when the short versus long fibers were active. The nonpainful side for the patients behaved normally (i.e., the same as in subjects in the control group).

What does this mean? It looks like changes in motor control of the back muscles of people with low back pain may be the key to preventing future episodes of pain. Alteration in the timing of the short fibers on the side of the symptoms may be the key. Proper timing of deep muscle activity is essential for normal spinal movement and spinal stability.

Without the normal firing sequence of muscles, motor planning is altered. As a result, the nervous system sets up a pattern of muscle activity that is different from normal. So, what caused this change in motor planning? Is there some kind of damage to the muscle itself? Or is it because the person alters the way they move to avoid pain and protect the spine?

It's possible that our beliefs about pain and the desire to avoid pain may actually be able to influence motor control at the same time. But the researchers in this study were unable to answer these questions. But it was the first study to clearly show a connection between abnormal motor control and recurrent back pain. And they clearly showed that just because back pain goes away doesn't mean the muscles have returned to normal. In fact, in between episodes of recurrent back pain, their back muscles aren't firing normally. This puts them at risk for reinjury and future episodes of pain.

The benefit of this information is that we can now try changing spinal function by restoring normal motor control and the timing of muscle activity. This is of particular interest to Physical Therapists who are movement experts. They can help patients learn how to move differently to avoid pain and protect the spine.

Finding ways to fine tune segmental motion should include looking at patient beliefs about their back pain. The goal is to help patients understand why they move the way they do and movement strategies used by some individuals in an attempt to prevent future episodes of back pain. This may be the key to preventing future episodes of pain.

strategies are what put them at risk of recurrence in the first place.

David MacDonald, et al. Why Do Some Patients Keep Hurting Their Back? Evidence of Ongoing Back Muscle Dysfunction From Recurrent Back Pain. In *Pain*. April 2009. Vol. 142. No. 3. Pp. 183-188.